

Zion-Mount Carmel Highway, Virgin River Bridge  
Spanning Virgin River  
Zion National Park  
Springdale vicinity  
Washington County  
Utah

HAER No. UT-39-C

HAER  
UTAH,  
27-SPDA.V,  
3C-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record  
Rocky Mountain Regional Office  
National Park Service  
Department of the Interior  
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HISTORIC AMERICAN ENGINEERING RECORD

Zion-Mount Carmel Highway, Virgin River Bridge  
(Virgin River Bridge)

HAER No. UT-39-C

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Location: Spanning the Mukuntuweap (Virgin) River in Zion National Park  
Springdale vicinity, Washington County, Utah

Date of Construction: 1930; Alterations - 1959, 1960

Original Use: Highway bridge

Present Use: Highway bridge

Significance: Although partially reconstructed in 1960, the Virgin River Bridge retains its structural integrity. Attractive and well-executed, the bridge is a three-span 'I' beam structure, which was skillfully camouflaged with 54-inch Redwood slabs to give it a rustic finish.

Researcher: James Jurale  
September 26, 1984

Zion-Mount Carmel Highway, Virgin  
River Bridge  
HAER No. UT-39-C  
(Page 2)

In February 1928, Thomas C. Vint, Chief Landscape Engineer, and Mr. Angwin, Bridge Engineer from the National Park Service Rocky Mountain Regional Office, made inspections of the bridge sites on the Zion-Mount Carmel Highway, which was in the process of construction. Work on the Virgin River Bridge lagged behind due to difficulty in landscape design.

Chief Ranger, Donal J. Jolley, reported in October 1929 that work had commenced on the Virgin River Bridge, "which when completed will connect the new Zion-Mount Carmel Highway with the present Zion Road. Construction work on the bridge had lagged behind due to a change in design and, according to Zion National Park Superintendent Scoyen, "the difficulties in arriving at a practical solution to this problem which will also be satisfactory from the landscape standpoint." Although it was open for traffic at the Zion-Mount Carmel Highway dedication ceremony on July 4, 1930, the bridge, which crosses the Mukuntuweap River, was not completed until the end of July. In 1960, it was widened.

The original Virgin River Bridge was 185 feet long, with a 20-foot driveway across the center and a five-foot sidewalk on each side, making a total width of 30 feet. Constructed as a three-span steel 'I' beam structure, it was camouflaged with 54-inch Redwood slabs to give it a rustic appearance. The spans were supported by two pieces of solid masonry 34 feet high.

On December 17, 1959, National Park Service personnel commenced removing the sidewalks and enlarging the road surface of the bridge. The old curb was dislodged by cutting and blasting, the edge of the pavement was leveled, and the debris removed. Steel reinforcing rods were placed in the 5-foot-wide trench on each side of the bridge. The gaps were then filled with poured concrete and the enlarged roadbed resurfaced. Renovation of the bridge, which spans the Virgin River approximately 2 miles north of the park administration building, was completed in March 1960.

The bridge's concrete and 'I' beamed roadbed is supported by pitcher-faced, ashlar, sandstone, masonry piers and abutments. "Spanning the tops of the piers and imbedded in the masonry are 1-1/2 feet by 3 feet (approximately) diameter beams which protrude from the piers on both sides. Fascia beams, 1 foot by 4 feet, line the lower sides of the roadbed. Ballustrade (sic), 4-inch by 10-inch, with 6-inch by 10-inch railings imbedded in spaced wood posts, form the guardrails.

Zion-Mount Carmel Highway, Virgin  
River Bridge (Virgin River  
Bridge)  
HAER No. UT-39-C  
(Page 3)

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HAER  
UTAH  
27-SPDA.V,  
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ADDENDUM TO  
ZION-MOUNT CARMEL HIGHWAY,  
NORTH FORK VIRGIN RIVER BRIDGE  
Spanning North Fork Virgin River on Zion-Mount Carmel Highway  
Zion National Park  
Springdale vicinity  
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

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HAER  
UTAH  
27-SPDA.V,  
3C  
(p.4)

ADDENDUM TO  
ZION-MOUNT CARMEL HIGHWAY, NORTH FORK VIRGIN RIVER BRIDGE  
Zion National Park  
HAER No. UT-39-C

Location: The bridge marks the approximate beginning of the Zion-Mount Carmel Highway, and is located at the confluence of the North Fork of the Virgin River and Pine Creek, Springdale vicinity, Washington County, Utah.

UTM: 12/324830/4120630  
USGS Quad: Springdale East, UT

Date of Construction: 1929-1930

Type of Structure: Vehicular bridge

Use: Vehicular bridge

Designer/Engineer: U.S. Department of Agriculture, Bureau of Public Roads; U.S. Department of the Interior, National Park Service.

Builder: Reynolds-Ely Construction Company, Springville, Utah.

Owner: National Park Service.

Significance: The North Fork Virgin River Bridge is significant for its association with the Zion-Mount Carmel Highway, constructed by the National Park Service and Bureau of Public Roads in 1927-30. The highway is listed on the National Register of Historic Places and is considered significant in the contexts of tourism and engineering. The bridge is an integral and necessary component of the highway and is also significant for its rustic style, designed to conceal its steel structure and to harmonize with the landscape.

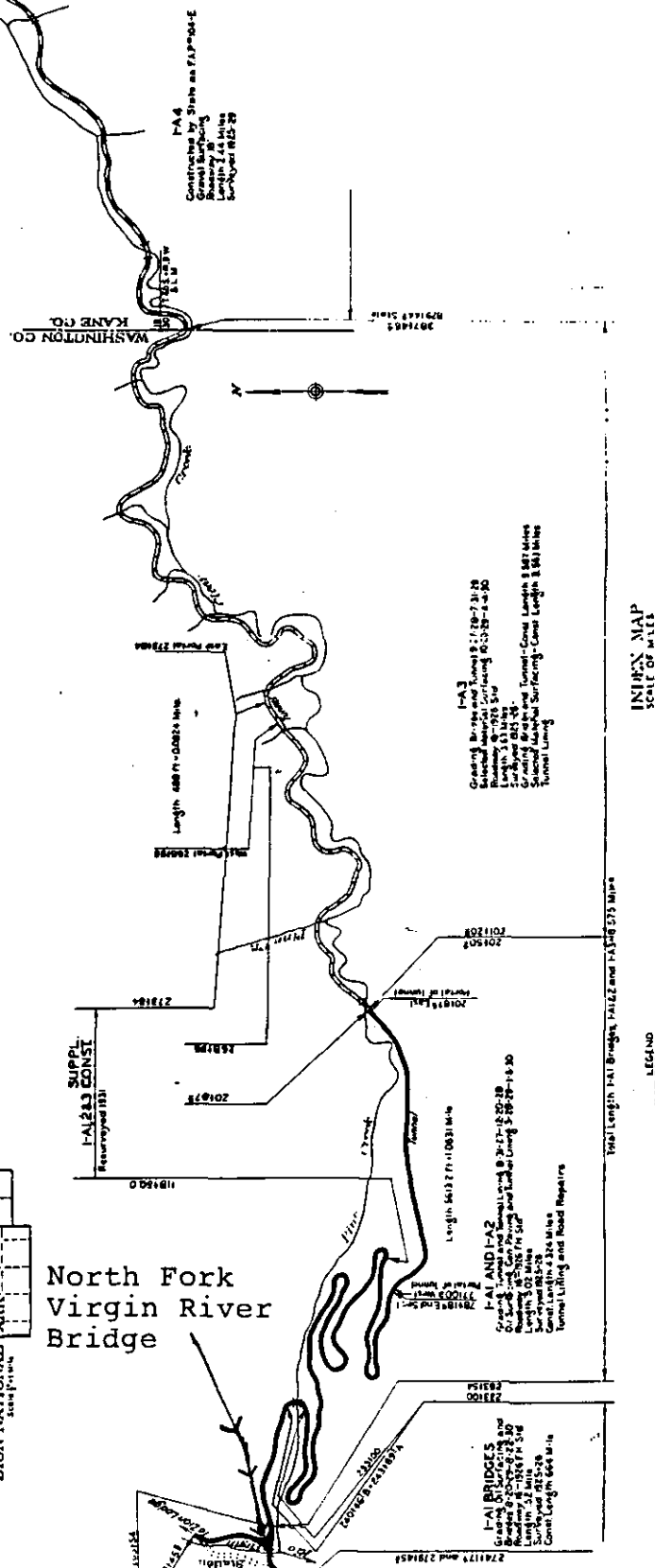
Project Information: Documentation of the Zion-Mount Carmel Highway North Fork Virgin River Bridge is part of the National Park Service Roads and Bridges Recording Project, conducted in the summer of 1993 under the co-sponsorship of Zion National Park and HABS/HAER.

Michael F. Anderson, HAER Historian, August, 1993.

A detailed map of Zion National Park and its surrounding areas. The map shows the park's boundaries, major roads, and various landmarks. Key locations labeled include Springdale, Alton, and the town of Panguitch. The map also shows the Colorado River and the Utah-Arizona border. A compass rose is located in the bottom left corner, and a scale bar is in the bottom right corner.

INDEX TO SHEETS		Drawings	Quantity	Remarks
1	Title	1	1	1
2	Layout	1	1	1
3	Plan	1	1	1
4	Gallery #1	1	1	1
5	Gallery #2	1	1	1
6	Gallery #3	1	1	1
7	6-12-1 Drawing	1	1	1

ZION-MOUNT CARMEL HIGHWAY,  
NORTH FORK VIRGIN RIVER BRIDGE  
HAER No. UT-39-C  
(Page 5)



ADDENDUM TO  
ZION-MOUNT CARMEL HIGHWAY,  
NORTH FORK VIRGIN RIVER BRIDGE  
HAER No. UT-39-C  
(page 6)

## INTRODUCTION

The 25-mile Zion-Mount Carmel Highway today connects southern Utah's principal north-south transportation arteries: Interstate 15 and Highway 89. Completed in 1930, it immediately served a number of regional transportation needs, including an all-weather road from Kane County and other points east of the Wasatch mountain range to the nearest railhead at Cedar City, and a well-graded modern highway for the growing number of tourists to southern Utah. The North Fork Virgin River Bridge, spanning the river at the southern terminus of Zion National Park's scenic Floor of the Valley Road, surmounted the highway's first natural obstacle and marks the very start of the historic road.

## HISTORICAL CONTEXT

Popular needs and demands for better east-west transportation in southern Utah lagged fifty years behind the earliest settlement in the region. Mormon colonizers migrating south from Salt Lake City had settled the Virgin River Valley and Zion Canyon by the early 1860s, but for several generations had more pressing concerns than construction of a road to the east. Cattle ranching and subsistence farming in the semiarid high desert region kept the settlers busy close to home, while trade and communication typically led west and north whence the pioneers had come: to the string of towns connecting the western boundary of the Mormon State of Deseret.

By the turn of the twentieth century, citizens of Rockville and Springdale immediately west of Zion Canyon had satisfied their few needs for access to the high plateau country. John Winder, a settler in the region since the 1880s, had improved an old Southern Paiute trail to the east rim which served cattlemen as well as operators of the Zion cableworks--the astonishing aerial tramway built in 1901 to transport lumber from the rim to the valley below. The road leading to the base of this trail at the lower cableworks (today's Weeping Rock area) was little more than a set of wagon ruts to be sure, but sufficed for driving cattle between summer and winter ranges and for moving lumber and supplies to and from the cable system.

Demands for better roads, not only in the Zion region but everywhere in the United States, awaited the dawn of the automobile age. As the nation awoke to the scenic splendors of the American West and coincidentally fell in love with the automobile, motor enthusiasts lobbied in varied ways for better



ZION-MOUNT CARMEL HIGHWAY,  
NORTH FORK VIRGIN RIVER BRIDGE  
HAER No. UT-39-C  
(Page 7)



Bridge reconstruction to widen roadway to 30 feet.  
December 1959 - April 1960. (Zion NP archives)



Steel truss bridge  
built in 1924-25  
spanning North Fork  
Virgin River. Re-  
placed by the new  
bridge in 1930.  
(Zion NP archives)

conduits to the national parks and forests. Motorists and businessmen alert to the possibilities of tourism first raised the cry in southwestern Utah in the 1910s, and it was not long before the State of Utah and the federal government responded with a decades-long program to improve transportation to and within Zion National Park.

A number of factors combined by 1920 to argue for a road passing through Zion National Park and connecting Highway 91--the "Arrowhead Trail"--25 miles to the west with Highway 89 equidistant to the east. Population and business growth in Kane County argued for an all-season, all-weather road across the north-south mountain range (the Hurricane Fault region) to the nearest railhead at Cedar City, Utah. Development of local scenic wonders--Zion, Cedar Breaks, Bryce Canyon, and North Rim of the Grand Canyon--and the emergence of a circle tourism route which connected the nascent parks suggested a shorter more scenic vacation if a road could be built through Zion. These factors, and a growing desire among locals for tourist dollars, led to the location, survey, and construction of the Zion-Mount Carmel Highway in the years 1923-1930.

#### LOCATION AND DESIGN

The preliminary location of the Zion-Mount Carmel Highway completed by Bureau of Public Roads (BPR) Highway Engineer R.R. Mitchell in late 1925 contemplated use of the existing bridge spanning the Virgin River, approximately 1000' upstream of the south checking station. The road would proceed from that point up the north talus slope of Pine Creek Canyon to the base of the Great Arch. Had Mitchell's location been chosen, today's North Fork Virgin River Bridge would not have been built.<sup>1</sup> As it turned out, the location's unsatisfactory grades, lines, and

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<sup>1</sup> R. R. Mitchell, Associate Highway Engineer, "Location Report Zion Park-Mt. Carmel Road: Zion Park Section," manuscript, 1926, Zion Tunnel and Road Reports File, Park Administrator's vault, Zion National Park (ZNP), 3.

The old bridge over the North Fork of the Virgin River 1000' upstream of the old south entrance checking station (roughly 600'-700' upstream of the current bridge)--by flood or intentional act--was removed by 1932. The superintendent in that year noted that the "west abutment of the old Virgin River Bridge" was intentionally removed. See ZNP Superintendent's Annual Report, 1932, history boxes, ZNP Archives.

ADDENDUM TO  
ZION-MOUNT CARMEL HIGHWAY,  
NORTH FORK VIRGIN RIVER BRIDGE  
HAER No. UT-39-C  
(page 9)

tunnel led to another investigation in June 1926, and a resurvey in November 1926. This resurvey resulted in the location eventually followed, and included the replacement of the existing bridge across the Virgin as well as bridges spanning lower and upper Pine Creek.<sup>2</sup>

Soon after the BPR completed the resurvey, NPS Associate Landscape Engineer Thomas C. Vint studied the lower portion of the new route with BPR Highway Engineer B. J. Finch. His letter to NPS Director Stephen Mather in February 1927, included the style, cost considerations, and need for the new bridges. From a landscape perspective, Vint was concerned that the location of the new bridge spanning the Virgin would be too close to the checking station and small headquarters unit. He suggested that either the NPS buy the land suggested by Superintendent Richard Evans near the park's south entrance and move the headquarters unit there, or eliminate the proposed new bridge and continue to use the existing bridge upstream. On this issue, Vint would lose because Arno Cammerer, Acting NPS Director, wrote back to inform Vint that the NPS did not have money lying around with which to purchase land.<sup>3</sup> The bridge would be built as located, although the checking station would be moved to the new south boundary in 1932, and the administrative complex would be moved and expanded to the south boundary in succeeding years.<sup>4</sup>

Another issue Vint addressed involved the style and costs of the new bridges. Vint and others concerned with the design had discussed the topic at length and it came down to a debate whether to use "rustic" concrete bridges, which the contractor

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<sup>2</sup> R. A. Brown, Associate Highway Engineer, "Final Construction Report on East Rim Road Route #1," manuscript, 1931, Zion Tunnel and Road Reports File, Park Administrator's vault, ZNP, 7-9.

<sup>3</sup> Thomas C. Vint to the Director, letter, 2 February 1927, and Arno B. Cammerer to Thomas C. Vint, letter, 11 March 1927, Zion Codex, ZNP library.

<sup>4</sup> The NPS did purchase 659+ acres at the south park boundary from local residents in 1931 for \$64,845. Today's administrative and campground complex area is developed on this land and other minor land acquisitions. The small administrative area in 1927-30 during Zion-Mount Carmel Road Construction was located upstream very near today's bridge on the north side of the road. See ZNP Superintendent's Annual Reports, 1931 and 1932, history boxes, ZNP Archives.

ADDENDUM TO  
ZION-MOUNT CARMEL HIGHWAY,  
NORTH FORK VIRGIN RIVER BRIDGE  
HAER No. UT-39-C  
(page 10)

could build immediately and use during construction, or build "sand stone faced arch type" bridges, which would cost at least \$100,000 more than the former type. Vint decided that the rustic type adequately fit the landscape and suggested its use, however, when the contracts were let a year and a half later, a sandstone type bridge prevailed for the Pine Creek Bridge. The new design for the North Fork Virgin River Bridge called for a steel girder span on masonry piers, with masonry-faced concrete abutments and a concrete deck with wooden guardrails. Massive redwood veneer was specified to conceal the steel beams.<sup>5</sup>

Bids were requested 30 July 1928, for construction of the North Fork Virgin River and lower Pine Creek bridges. Five firms responded and the BPR recommended award to C. F. Dinsmore of Ogden, Utah, who submitted the low bid of \$180,731. The Secretary of the Interior rejected all bids, however, perhaps because the engineer's estimate was only \$174,290 and few contracts were ever awarded that exceeded estimated costs. Vint and others redesigned the bridges and the contract went out to bid again 23 July 1929. This time the Secretary agreed with the award to Reynolds-Ely Construction Company of Springville, Utah, for the low bid of \$136,918.12. The new design called for the bridge types described above, but for some reason the cost was not as prohibitive as Vint and others had originally thought they might be. Engineer's estimates on this project came to \$155,820.<sup>6</sup>

#### HISTORY OF CONSTRUCTION

The contractor arrived at the site 10 November 1929 and began work on a camp, opening of a rock quarry, and concrete aggregate production, all of which would serve crews working on both bridges simultaneously. Excavation for abutment footings and piers began a month earlier, on 7 October, and was completed on 30 November. Men completed the concrete footings December 4th. The contractor erected a "travelling crane": a system which spanned the river with 300' of track and used a running crane with a span of 50'. Crews used the crane to manipulate and place the rock and concrete for piers and abutments, which they completed 10 March 1930. The men erected the structural steel by 17 April and poured the concrete slab on 28 April. Finishing work consisted of 54" redwood slabs, handrails, sidewalks, and paint for the

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<sup>5</sup> Vint letter, 2 February 1927.

<sup>6</sup> Brown, "Final Construction Report," 16-17.

ADDENDUM TO  
ZION-MOUNT CARMEL HIGHWAY,  
NORTH FORK VIRGIN RIVER BRIDGE  
HAER No. UT-39-C  
(page 11)

structural steel, all of which the crews completed by 9 August. Final cost to the government was \$66,416.11 including engineering work done by the Bureau of Public Roads.<sup>7</sup>

Periodic inspections by 1957 had revealed spalling and cracking on concrete portions of bridges within the park. These problems were thought to be the result of freezing and thawing as well as "alkali reactive aggregates," and inspectors believed the deterioration might be slowed by the application of hot linseed oil and paint. Despite the deterioration, the superintendent concluded that they were in "fairly good condition" considering their age. The inspections probably referred more to the nearly all concrete bridges built by the State of Utah on the east side of the park which, by 1993, had deteriorated to the point where they had to be replaced.<sup>8</sup>

One aspect of major road reconstruction of the park's south entrance road during the Mission 66 years included the widening of the roadway across the North Fork Virgin River Bridge. This work began in December 1959, on the bridge's downstream side where crews blasted and drilled the 5' wooden sidewalk and concrete curb, levelled the edge, placed steel reinforcing bars in the resultant trench, placed forms, then poured concrete to road level. They finished the downstream side in February 1960, then repeated the same construction steps on the other side. The entire project was completed in April 1960, with a new wearing course of asphalt. Photographs of the reconstruction indicate that the bridge's guardrails were reconstructed at this time. Wing walls were also extended at the east end of the bridge in May 1963.<sup>9</sup>

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<sup>7</sup> Brown, "Final Construction Report," 58-59; James Jurale, "Classified Structure Field Inventory Report-Virgin River Bridge," Haer No. UT-39-C Zion-Mount Carmel Highway Field Records, 1984; Donal J. Jolley, ZNP Ranger, Monthly report to the Superintendent, October 1929, history boxes, ZNP archives.

<sup>8</sup> ZNP Superintendent's Monthly Narratives, March 1957, history boxes, ZNP archives.

<sup>9</sup> Jurale, Field Inventory Report. See also ZNP Superintendent's Narrative Reports, December 1959 (with photograph); January, February (with photograph), March, 1960; May 1963, all in history boxes, ZNP archives.

## DESCRIPTION

The three-span I-beam bridge measures 185' long with a 30' roadway afforded by the sidewalk and curb removals of 1960. The center span measures 88' and outer spans 48' 5 1/4" inches each. The bridge's concrete and I-beamed deck is supported by 34' high, pitcher-faced sandstone ashlar piers and abutments. Spanning the tops of the piers and imbedded in the masonry are 1-1/2' x 3' (approx.) false beams which protrude from the piers on both sides, giving the appearance of rustic timber construction. 1' x 4' fascia beams line the lower sides of the roadbed. 4" x 10" balustrade, with 6" x 10" railings imbedded in spaced wood posts form the guardrails. Rustic touches include the 54" redwood slabs placed against the outside beams to hide the steel work and blend with the wooded setting. The bridge remains essentially unaltered since 1963, other than minor work associated with maintenance such as periodic replacement of the wearing course and staining of wooden parts. Despite the widening completed in 1959-60, it retains its essential integrity from an elevation perspective.<sup>10</sup>

Considerable landscape changes have occurred in the immediate area of the North Fork Virgin River Bridge over the years. Prior to European-American settlement, the river bed within Zion Canyon was thick with underbrush and trees. Early settlers noted that they had to travel far from the river bank or within the bed itself to move up canyon. Settlers cutting wood for homes and fires as well as grazing cattle and sheep denuded much of the riparian environment of willow, cottonwood, maple, boxelder, ash, grape, squaw bush and grasses, and incidentally exacerbated flood and siltation problems.<sup>11</sup> Vegetation had come back somewhat by 1930, 21 years after establishment of the monument and 15 years after grazing ceased within Zion Canyon. Today, the immediate area surrounding the bridge is well-vegetated with brush and

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<sup>10</sup> Jurale, Field Inventory Report; ZNP Superintendent's Annual Report, 1930, history boxes, ZNP archives; Utah Department of Transportation, "Structural Inventory and Appraisal Sheet: National Bridge Inventory--Structure Inventory and Appraisal," UDOT main office, Salt Lake City, Utah.

<sup>11</sup> "Statement of Elijah C. Behunin," transcript, 31 August 1930, Zion Codex, ZNP library. Behunin was the 15-year-old son of Isaac Behunin when the latter first settled in Zion Canyon in 1862. He recounts how they set fire to the thick native grape vines and cleared trees to build fences, and the changes that occurred.

ADDENDUM TO  
ZION-MOUNT CARMEL HIGHWAY,  
NORTH FORK VIRGIN RIVER BRIDGE  
HAER No. UT-39-C  
(page 13)

cottonwoods, but the appearance is likely more barren than before 1860.

The built landscape has changed as well. In 1929, visitors to Zion National Park drove past old homesteads, outbuildings, fencing, and yard clutter to arrive at the south entrance just short of today's bridge. Here they found a rustic masonry checking station/museum along the northwest side of the road just a few hundred feet from today's bridge. Without a thought for Pine Creek--which was totally undeveloped for visitor use--they continued another few hundred yards to the 1925-26 steel arch girder bridge upstream of today's bridge. This two-span bridge with a concrete center pylon and masonry abutments was utilitarian but unobtrusive and served well until replaced by the new bridge in 1930.<sup>12</sup> Crossing the old bridge to the southeast side of the river, they continued up the Government Road, constructed in 1923-25, to the new Zion Lodge and beyond. A small portion of this road can be followed today from the parking area northwest of today's bridge. A wooden gate bars autos, but the visitor can walk up the road, cross a drainage on an old single-span plank bridge, and continue to the end at the river. There is no sign of the girder bridge (gone by 1932) nor the wood bridge which preceded it, but the 1941 diversion dam and apparatus is passed along the way.<sup>13</sup>

The 1930 North Fork Virgin River Bridge bypassed the initial segment of the Government Road and girder bridge by crossing the river several hundred yards closer to the entrance station. A new segment of the Government Road to the point where the old bridge touched the southeast side of the river bank was constructed as a part of Section 1 work on the Zion-Mount Carmel

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<sup>12</sup> Photograph of the steel girder bridge taken in 1929, Historic Photograph File, ZNP archives.

<sup>13</sup> Wesley Dennett, Springdale, Utah native and former Zion employee, taped interview by Michael F. Anderson, 8 July 1993. Wesley pointed out remaining segments of the old Government Road which can still be followed in various places on the southeast side of Zion Canyon and in the area leading to the old bridge site. He also provided the date for the diversion dam.

Notes on the construction of the Government Road can be found in the ZNP Superintendent's Annual Reports, 1924, 1925, Zion Codex, ZNP library. See also George A. Gregory to the Director, letter, 8 December 1925, Zion Codex, ZNP library, for details of Government Road construction.

ADDENDUM TO  
ZION-MOUNT CARMEL HIGHWAY,  
NORTH FORK VIRGIN RIVER BRIDGE  
HAER No. UT-39-C  
(page 14)

Highway project. This is the start of today's Floor of the Valley Road which replaced the entire Government Road in 1931-32. The intersection of the two roads at the southeast side of the new bridge formed a "Y", which the NPS landscaped. That "Y" has since been replaced with perpendicular turns--an unfortunate landscape alteration.<sup>14</sup>

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<sup>14</sup> ZNP Superintendent's Annual Reports, 1931, 1932, history boxes, ZNP archives; Photograph of the intersection "Y" in Historic Photograph File, ZNP archives.



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ADDENDUM TO

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(Virgin River Bridge)

Zion National Park Roads and Bridges

Spanning North Fork Virgin River on Zion-Mount Carmel Highway

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